CEOS
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CONTENTS

Report from the 13th CEOS Plenary and 4th IGOS Partnership Meetings

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EUMETSAT

EUMETSAT hosted the 14th CEOS Plenary meeting and the 4th meeting of the IGOS Partnership in Stockholm from 10-12 November, 1999. The Swedish National Space Board (SNSB) supported the organisation of the meetings.

The CEOS Plenary was opened by Dr.Per Tegnèr, President of the SNSB. The Plenary's first, and pleasant, task was to accept the Argentinean Comision Nacional de Actividades Espaciales (CONAE) as a Member, and the International Ocean Colour Coordinating Group (IOCCG) as an Associate, bringing the total CEOS membership to 40 : 21 Members and 19 Associates.

CEOS business centred mainly around four principal subjects :

- taking forward the IGOS Partnership ;
- outreach activities ;
- the activities of the working groups ;
- relations with the Earth Observation private sector.

The IGOS Partners meeting focussed primarily on the first two of these issues.

Plenary briefed its representatives to the 4th IGOS Partnership meeting, which was also chaired by the Chairman of CEOS, and, after the Partnership meeting, confirmed the consequential actions for CEOS.

Plenary participants at Stockholm

The Partnership discussed Dr Eric Lindström's (NASA) report from the Oceans Theme team, and made a number of suggestions for incorporation in the final report which is due to appear early in 2000. It urged the Partners to consider the recommendations and implement them within their programmes. On this basis the CEOS Plenary agreed that the SIT should convene early in 2000 to address the space observations, whilst IOC offered to lead on the *in situ* issues. To this end CEOS extended the mandate of the Strategic Implementation Team (SIT) for a further year, under the chairmanship of Jean-Louis Fellous (CNES), and with Mr.M.Konaka (STA) as Vice-Chairman.

The Partnership also agreed to constitute a theme team on the Global Carbon Cycle, and further agreed that there would be three elements. The Terrestrial Carbon Cycle element will involve GTOS, IGBP and FAO. The Ocean Carbon Cycle element would be included in the Oceans Theme Report, and Partners agreed to nominate participants for this part of the Oceans Team, who would support NASA. An over-arching activity to link the terrestrial and ocean elements of the Global Carbon Cycle would be started with GCOS, GOOS, IGBP, GTOS, and NASA all involved. These partners would decide which organization should lead the activity. Consideration of the proposal for a theme team on Disaster Applications was deferred to a future IGOS-P meeting, to allow for further discussion between the potential contributors.

It is now clear that the IGOS Partnership has reached a level of maturity which allows it to deal effectively with the complex series of tasks it faces. The incoming Chairman, Dr.Robert Landis of WMO, confirmed that the next meeting will be held in Geneva in June, 2000.

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Way Ahead for the Integrated Global Observing Strategy (IGOS)

Dr. Jean-Louis FELLOUS
Chair, Strategic Implementation Team, CNES

The IGOS concept was fully endorsed in 1999 by all the Partners: the G3OS and their sponsors co-ordinating the in situ component, CEOS agencies developing the space component, and the global change research programmes and funding agencies, helping to increase the scientific understanding. In this context, the CEOS 13th Plenary held in Stockholm (November 10-12, 1999) decided to continue the Strategic Implementation Team (SIT) as a senior level, advisory body within CEOS which should remain the oversight and implementing arm for IGOS space activities.

SIT tasking for the year 2000

The tasking of SIT is to implement IGOS actions with a specific responsibility for the space component including integration across themes. The first task of SIT is to implement and develop the IGOS space component through:

- reviewing the recommendations from the theme teams and responding to key deficiencies raised;
- structuring and assembling space agency responses to the IGOS requirements;
- identifying and acting on IGOS theme implementation issues (including gaps and overlaps) requiring resolution;
- serving as an initial focus for integrating the space component with the *in situ* component, and,
- providing an assessment of progress in implementing the IGOS themes.

The second task of SIT is to co-ordinate CEOS agency activities with regard to IGOS by:

- promoting and assisting in a more integrated, collective response from space agencies;
- helping prepare CEOS representatives for the IGOS Partnership meetings, including the development of common positions, and,
- addressing, as appropriate, data and information dissemination and CAL/VAL issues with the respective CEOS working groups.

SIT's third task is to develop, implement, and review strategies for outreach and education through:

- informing and developing materials about CEOS contributions to IGOS;
- initiating proposals for IGOS Partner consideration, and,
- working, together with IGOS Partners, with the international conventions for climate change, biodiversity, and others.

The Ocean Theme

The Ocean Theme serves as a pathfinder for the theme concept and will therefore allow experience to be gained on the practical implementation procedures. The Ocean Theme Team is still in the process of refining its interim report but changes are expected to be additions and not modifications of those recommendations already stated in the draft document presented in Stockholm. The key issues addressed by the Ocean theme concern:

- a long term continuity challenge for ocean observations;
- a knowledge challenge through scientific and technology developments;
- the establishment of data services with products and associated quality control, and,
- the development of awareness directed toward relevant bodies at national and international level as well as toward the general public.

Therefore the Agencies are invited to start preparing the wording of their commitments to the Ocean Theme, within the timeframe of the SIT 6th meeting (to be held on March 26, in Cape Town, South Africa) so as to resolve their relative roles and contributions to the space component, based on a "best efforts" approach. These should include :

- confirmation and timing of missions already planned;
- phasing of the decision process for proposed missions using known technology;
- process (structures, decision, timing) for transitioning research instruments into operational instruments;
- plans for the development of new technologies, products or missions;
- plans for the development of data bases, and,
- awareness and outreach.

The Carbon Cycle Theme

The newly established "Carbon Cycle" Theme, with particular attention to the sub-theme "Terrestrial Carbon Cycle", that GTOS, together with FAO, have accepted to lead, will be the subject of preliminary discussions with the team leaders during the SIT 6th meeting, which will also tackle the topic of the ocean carbon cycle as derived from the Ocean theme report. The 7th meeting of SIT will meet on June 6, in Geneva, just before the next IGOS Partnership meeting.

The Ocean Theme of the Integrated Global Observing Strategy (IGOS)

Dr. Eric Lindstrom
IGOS Ocean Theme Team Leader, NASA Headquarters

The observing elements and the technology enabling global oceanography and improved global modeling and data assimilation activities – legacies of the 1990's – have made improved ocean products and analysis possible. A challenge has remained to continue a core of global ocean observations for the long term. The Global Ocean Observing System (GOOS) is the international process by which an operational oceanographic observing system is designed and coordinated. GOOS operates within a broader framework of international agencies and conventions, observing systems, and research programs. A common difficulty in this framework is attaining commitment of resources for specific observing systems given the many overlapping requirements of programs and capabilities of agencies and nations.

The Integrated Global Observing Strategy (IGOS) unites the major satellite and surface-based systems for global environmental observations of the atmosphere, oceans, and land. It is a strategic planning process and a framework for decisions and resource allocation by individual funding agencies. The IGOS Partnership was established in June 1998 as a natural convergence of the efforts of a number of international agencies concerned with global environmental issues, research, and provision of Earth observations. The Partnership comprises the program offices of the three Global Observing Systems (GOOS, GCOS, GTOS), the international agencies which sponsor the Global Observing Systems (FAO, ICSU, IOC, UNEP, UNESCO, WMO), the Committee on Earth Observation Satellites (CEOS), and agencies involved in implementing and encouraging research programs on global change (IGBP, WCRP, IGFA). More detail on IGOS is available at the IGOS Partners web site (http://www.igospartners.org).

The IGOS Partnership has endorsed a new approach for IGOS implementation which utilizes thematic areas. With a view toward broadening IGOS to include the observing activities of all Partners, the themes concept was developed to provide a more coherent focus for the definition and implementation of IGOS. The fundamental underpinning of the theme approach is the acceptance that IGOS must establish priorities within broad theme areas; that the priorities must take account not only of the requirements of international programs but also those of national and regional programs and must be sensitive to major issues connected with international conventions; that IGOS must seek to exploit what already exists and seek to improve it incrementally.

The oceans theme was identified as a pathfinder to demonstrate the concept and was recommended to move immediately into the implementation phase. NASA agreed to chair an "Ocean Theme Team," which includes representatives from GOOS, CNES, ESA, ISRO, NASDA and NOAA. The Ocean Theme Team has drafted an interim report, which was presented to the IGOS Partnership meeting in November 1999. The report is based on examination of requirements and capabilities for ocean observation in light of specific needs such as seasonal-to-interannual climate prediction, improved marine weather prediction, and improved scientific understanding of marine ecosystems. The focus is on identification of gaps and overlaps in the observing system where action and commitment of resources by the IGOS Partners would lead to an improved or more effective system. The recommendations of the theme team include some specific requests for immediate action by the IGOS Partners and some ideas for action over the medium and long term to facilitate development of an integrated ocean observing system.

The Ocean Theme Team report is a call for concerted action. It underscores the GOOS vision of developing and maintaining global ocean observing tools for a permanent global ocean observing system. It also provides an opportunity to build on the work of two of the demonstration projects of the Committee on Earth Observation Satellites Strategic Implementation Team (CEOS SIT). It folds together the IGOS-related portions of the Global Ocean Data Assimilation Experiment (GODAE) and the Ocean Biology Projects, bringing together disparate pieces, thereby demonstrating the utility of IGOS for oceans. It attempts to consolidate recent scientific gains in in-situ observing, remote sensing, ocean model development and data assimilation into an ongoing, robust ocean observing system. Most significantly, the report provides first recommendations to the IGOS Partnership for allocation of resources--critical areas for action to assist in developing the capability for global operational oceanography. The initial focus of the Theme Team has been on gaining commitment to the integrated *in situ*/space-based observations required

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The Terrestrial Carbon Observation Initiative (TCO)

Drs. Jeff Tschirley, Josef Cihlar, Scott Denning and Rene Gommes[*1]

At its Fourth meeting (Stockholm, November 1999), the Integrated Global Observing Strategy Partners (IGOS-P) approved terrestrial carbon as a theme for which a systematic global observation initiative should be developed under the leadership of the Global Terrestrial Observing System (GTOS). They also approved a process whereby terrestrial requirements will be integrated with the ocean carbon observation requirements being developed in the IGOS ocean observation theme.

The need for systematic assessment of carbon pools has become more important as countries realize that their status as a net "sink" or a "source" of carbon vis à vis UNFCCC and the Kyoto protocol has implications for their future economic development. Policymakers are also understanding that a large portion of the global annual net primary ecosystems productivity is found in economic spheres such as forests, cropland and pasture.

Although carbon pools and their long-term changes will be at the heart of ongoing negotiations under the UNFCCC, there is also need to estimate carbon fluxes which are of a more short-term nature. The reason is that the consistency and reliability of our data on carbon pools can only be validated using models which in turn highlight the gaps in our current knowledge. They are also useful for identifying new observation requirements that can lead to greater confidence in both the pool and the flux data.

Because many factors interact to affect the carbon cycle, both above and below the soil surface, information on terrestrial carbon must be obtained frequently and with a high spatial resolution. Given the limitations of measurement techniques, this has not been possible in the past. New methods, including observing techniques and process-oriented models, now make the problem more tractable. This is a major reason for the increasing research interest in the observation and quantification of terrestrial carbon.

To consolidate and systematise global observations of terrestrial carbon, there is a need to agree on the observation and modelling requirements; to harmonise the main relevant projects and activities that can contribute to a global observing 'system'; and to identify gaps and ways to fill them. The Terrestrial Carbon Observation Initiative' (TCO) aims to meet these needs.

The number of programs and initiatives concerned with this topic is steadily increasing, at national, regional and global levels. Some have a strong observational base and include satellite data, others are based on modelling or on local measurements using a sampling strategy.

Some requirements for estimating terrestrial carbon are well understood although in certain cases the continuity of their measurement is of concern. Th include: land cover and land cover change, leaf area, biomass burning (fire scars), solar radiation, atmospheric composition, surface fluxes, and crop and forest production. The observational requirements for these issues have been established through various experiments and regional studies.

Other observations are less well understood and techniques for their measurement may not be sufficiently developed. While progress has been made in some cases, further work is needed before global observations can be implemented. The most important remaining issues are: biomass and its changes, canopy structure, atmospheric CO_2 concentration at a micro-scale, plant biogeochemistry, and meteorological parameters with a fine spatial resolution.

The importance of these observations is genera accepted by scientists and to varying degrees the observation techniques have also been developed. However, there is lack of experience in dealing with these types of data and therefore with the derivation of appropriate bio-physical variables for use in carbon exchange models. Thus, further research and technology development are also necessary.

There is a clear need to move beyond the current approach whereby process models are tested on a very small scale, pronounced to be valid and then extended to the global scale. An observation network is needed that allows the development and testing of both process-based ecosystem models, their extrapolation

[*1]Respectively affiliated with: the Global Terrestrial Observing System, the Canadian Centre for Remote Sensing, Colorado State University, and the Food & Agriculture Organization of the UN.

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to larger scales, and the assessment of sub-continental-scale flux variability.

The TCO design must support a range of observation and modelling requirements and must be developed with the involvement of the observation and modelling specialists as well as representative from the policymaking community.

A programme of work has been established to launch TCO. Its success will depend on close collaboration and a shared sense of priority among the key partners – the observing systems, the international scientific community, UN organizations and the space agencies.

Additional information about the terrestrial carbon observations initiative can be found in the second issue of the IGOS bulletin. The TCO prospectus can be obtained from the GTOS Secretariat (gtos@fao.org).

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The Ocean Theme of The Integrated Global Observing Strategy

for ocean surface topography, ocean surface vector winds, ocean color, sea ice, and sea surface temperature. Further work is ongoing to enhance the ocean theme analysis in the area of *in situ* measurement and ocean biology.

The Ocean Theme Team presented an interim report to the CEOS Plenary and IGOS Partnership meetings in Stockholm, November 1999. The report was well received by the IGOS Partners. Their response to the Ocean Theme recommendations and commitment to action by the Partners is expected in 2000, roughly one year after inception of the theme effort. A meeting of the CEOS Strategic Implementation Team is expected to be devoted to oceans – and commitments to action by space agencies stimulated by the theme report. A "commitments" meeting of agencies involved in funding *in situ* measurements is also being planned.

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Report from the 13th CEOS Plenary and 4th IGOS Partnership Meetings

Reports were given to Plenary of the many outreach activities during the year, including participation in UNISPACE III and presentations to COP 5. Through these type of activities the potential of CEOS, and of IGOS, is becoming more widely known, and it was agreed to continue these outreach activities in 2000. The Chairman thanked all the parties who had worked to support these activities, particularly FAO, NASA, ISRO, WMO and GCOS. The CEOS Plenary and IGOS Partnership meeting both thanked their Japanese colleagues for the production of the Newsletter and the IGOS brochure, as well as CNES of France for the IGOS bulletin.

The reports of the CEOS Working Groups confirmed that they remain a strength of CEOS, and Members were urged by the Chairman to take account of the WG activities and where appropriate give more support to their work. Two new ad hoc working groups were established for the year 2000: one on Disaster Management Support (chaired by NOAA), intended to maintain the CEOS effort in this field, and the other on Education and Training in Developing Countries (chaired by ISRO).

The Chairman reported on contacts with the Earth Observation private sector. A major conclusion was that the private sector do not see the need to join CEOS, but they would welcome a regular annual meeting information and opinions can be exchanged. The next meeting will be organised in conjunction with the IAF in Brazil in October, 2000.

Not quite all was work : participants were also given the honour of a reception in Stockholm's magnificent Town Hall, and a dinner was arranged in the Vasa Museum, in the shadows of the salvaged man o'war, and to the strains of Swedish folk music.

When the Resolutions had been formally agreed and the remaining items of business settled, the chairmanship of CEOS was transferred to the Brazilian Institute for Space Research – INPE. The Director, Mr. Marcio Barbosa, had been unable to be in Stockholm, but his representatives confirmed INPE dedication to their duties in 2000 and welcomed participants to the 14th CEOS Plenary in Brazil in November, 2000.

Working Group on Calibration and Validation Planning for 2000

Dr. Alan Belward
Chair, WGCV,
European Commission DG-JRC

Since its inception in 1984 the Working Group on Calibration and Validation has focussed on ways in which the group can help ensure long term confidence in the accuracy and quality of Earth observation data and products from satellites. The topics debated by the Working Group centre on two key issues; firstly sensor-specific calibration and validation, and secondly geophysical parameter and derived product validation. WGCV provides a forum for calibration and validation information exchange, co-ordination and co-operative activities. The WGCV promotes the exchange of technical information and documentation, joint experiments, and the sharing of facilities, expertise and resources among its members as appropriate. This approach has served the community well over the last sixteen years, leading to better quality data, better documentation and sustained commitments to provide calibration updates. But more of the same is not enough.

Whilst debate and exchange of information are essential, WGCV is by no means the only mechanism for this; scientific workshops and conferences too provide opportunities for public debate and peer review. But unlike WGCV these always embrace a range of issues, rather than focussing, and discussion is always time limited. WGCV provides an opportunity to achieve far more. The Working Group and its all-important technical sub-groups provide a forum for sustained debate, international co-operation and common actions too. In particular this last attribute is under exploited. WGCV membership embraces all the world's major civil agencies responsible for Earth observation satellite programmes and international user organisations. This is a powerful combination and one with the potential to answer a key "cal/val" question…who is responsible for and performing the cal and val?

As the Integrated Global Observing Strategy (IGOS) gains momentum there will be an increased need to co-ordinate and steer the transition of scientific output to operational observations. Central to the IGOS concept is use of resources (be they *in situ* or space) from multiple providers. The requirements from a cal/val perspective are clearly common standards and common methods. Issues such as traceability*1 and the need for shared access to *in situ* observations arise from these requirements.

The civil space agencies accept the responsibility for instrument calibration and invest a great deal of time, effort and financial resources in ensuring long-term instrument calibration. The costs in these terms of dealing with traceability are at present largely unquantified. Through the conventional WGCV route of debate and discussion WGCV intends in 2000 to document the ramifications of traceability for future mission planning.

A number of agencies (both CEOS Members and Associates) too are establishing in-situ measurements at validation sites, airborne campaigns, and acquisition of high-resolution satellite data as part of strategies for product validation. There is an unequivocal need for proactive measures to ensure common validation protocols. A common approach will allow widespread use of validation data, and work towards standardised approaches to global validation. Guidance is needed for *in situ* data collection, instrumentation, sampling designs and strategies, modelling and dealing with transitions of scale from *in situ* to airborne, and satellite data. The use of data from multiple sensors operated by different agencies for creation of global products means that the need to work together is stronger than ever.

At the end of 1999 WGCV created a new sub group to examine land surface parameter validation. This group must ensure global co-ordination of these efforts. It is probably too early in the process to advocate more "hands-on" approach than has traditionally been the role of WGCV, but there is a real risk that without growth in this direction validation of global products (especially terrestrial products such as land cover) will remain elusive. WGCV is a recognised international forum with dedicated and committed members, in 2000 we expect that participation from both Member and Associate CEOS organisations will lead to significant steps forward in terms of validation of global products.

*1: Traceability refers to an auditable route describing and confirming the calibration chain and attributed accuracy back to an internationally agreed reference, usually SI as maintained by a national standards laboratory.

Working Group on Information Systems and Services: An Update and Some Issues to be Addressed

Mr. Peter N. Churchill
Chair, WGISS,
European Commission DG-JRC

The 9th Meeting of the Working Group on Information Systems and Services was held on the 6th – 8th October 1999 in Nairobi, kindly hosted by the United Nations Environment Programme (UNEP).

Prior to the meeting UNEP organised a Workshop entitled "Is there Earth observation outside the OECD". This enabled WGISS participants to discuss issues related to information systems and services with people working in Africa and India who use spatial information, including Earth observation data on a regular basis. A very free and lively exchange took place, raising a range of issues. Out of the discussion a number of concrete actions emerged for WGISS, including help in data rescue and input into on-going projects related to urban monitoring, bathymetric mapping and biomass burning.

The WGISS meeting itself concentrated on a number of key issues. The first dealt with WGISS's desire to form a closer link with relevant standards organisations. David Giaretta, Chair of CCSDS Panel 2, attended the meeting and provided WGISS with his view of areas of potential collaboration. The resulting discussion identified a clear interest by both parties to cooperate, with a number of areas of cooperation identified. These ranged from requirements gathering, to architectural design, to prototyping and to the final adoption of the resultant standards by CEOS members and associates. This discussion will be developed further by WGISS at future meetings.

The status of the various developments related to the interoperability of catalogues was also discussed. It was identified that catalogue interoperability had now progressed within (but not limited to) the Earth observation world to a level where it was now becoming a reality. Three interoperability "worlds" were identified; that based on the CEOS development, the Catalogue Interoperability Protocol (CIP), that based on the NASA developed protocol IMS, and that based on a protocol addressing the wider geographic information world, GEO. With the further development of CIP all three interoperability "worlds" will be themselves interoperable. CEOS Members and Associates had begun to actively implement one of the three solutions within their catalogue systems, although it was recognised that still more effort was needed here.

A great deal of consideration was also given to the potential merging of CEOS and the USA / Japan initiative the Global Observation Information Network (GOIN). GOIN's objective is to exchange global environmental data via information networks within and between the USA and Japan. WGISS has been given the task by the CEOS chairman of evaluating if and how this can be achieved. The final conclusions of WGISS, prompted by a special Task Team on the subject led by Takashi Moriyama of NASDA, former chairman of WGISS, will be reported to CEOS Plenary in the autumn of 2000.

Finally, WGISS began a process to take stock of itself, the good technical work it has achieved, and to assess which key issues confronted it over the next period of time and that should be addressed. At WGISS 9 a number of issues were discussed and agreed. Four key issues were identified against which WGISS needs to take action.

The first addressed the geo-information field, which is one of the fastest growing sectors in information technology, and one that should embrace data from Earth observation satellites. Within the geo-information range of activities, Geographic Information Systems (GIS) and associated data and information systems are likely to have major direct impact on future WGISS planning.

The second issue noted that in a rapidly developing technical world, including in the wider geo-information world, the use of standards is becoming increasingly important. WGISS is seeking to work in closer collaboration with relevant standards organisations to begin to achieve this.

Thirdly it was recognised that commercial entities are becoming increasingly important in Earth observation, both in the operation of earth observation missions and in the definition, design, building and operating of data and information systems. WGISS will seek to work in close cooperation with these commercial entities to ensure coherence of approach.

Finally, it was agreed that WGISS has achieved a series of technical milestones in developing and recommending tools, techniques and standards in data and information management, however, there is a need to improve the uptake by CEOS Members and Associates.

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CEOS Sets up Ad Hoc Working Group on EO Education and Training

Mr. Mukund Rao
Chair, WG-Edu, ISRO

Education holds the key to future space technology development and its applications and thus space education needs to become an essential element in this competitive world. Establishing a wide network of education and a sustained human resources development must be the imperative for the 21st century - with a view to build capacities with far reaching impacts on the space utilisation amongst various countries.

The UN has established Regional Centres for Space Science and Technology Education in different regions of the world. These Centres provide opportunities for developing country scholars to undertake Post Graduate courses in Remote Sensing and GIS. Inter-governmental agencies (like FAO, ESCAP, UN-OOSA and others) also have active programmes in education and training in EO. Apart from this, specific programmes for graduate students and young professionals are undertaken by a number of regional institutions in different countries. The UN Regional Centres could emerge as the" hub" for regional EO education and training efforts.

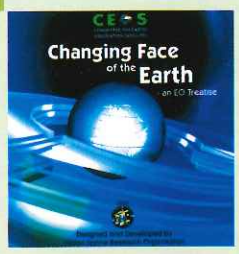
CEOS agencies also have programmes that support education and training in specific areas of EO - ranging from instrumentation, digital image analysis, GIS, Applications of EO to specific theme areas and also in addressing natural resources management.

Some of the major concerns for an EO Education and Training programme include - Development of teaching materials and aids; Availability of EO data; Faculty and Expert personnel availability; Necessary curriculum development and standardization; Establishment of necessary facilities and laboratories; Availability of Fellowships and travel grants; Publication of materials - books and exercises materials for a self-learning mode of classes for students; Outreach with other institutions - Internet connectivity; Multi-media teaching aids and materials; Projects and case studies and Financial resources for the conduct of the activities.

In the interest of promoting EO technology and applications, CEOS has taken a proactive role and provides a focus to the activity of education and training in the field of EO by setting up an ad hoc Working Group on EO Education and Training (WG-Edu). As part of this, the WG-Edu would make a work plan for CEOS to take up in the field of EO Education and Training. The WG-Edu will:

- Assess the EO Education needs in developing countries by networking with agencies involved in education and training, specially the UN Regional Centres for Space Science and Technology Education.
- Assess technology trends in EO and recommend the topics of relevance for education and training - which can then be incorporated in the curriculum
- Recommend a Plan of Action for CEOS participation in EO education activities and also how CEOS members can coordinate effective programmes at national level
- Focus CEOS members and WGs for furthering capacity-building activities and contributing to the EO Education efforts

ISRO is providing the lead to the Working Group and various CEOS agencies have nominated representatives to the WG. The WG-Edu will interface with various agencies and have its maiden Meeting in August, 2000 before finalizing a Plan of Action for CEOS Plenary to consider.



ISRO has published a CD-ROM on "Changing Face of the Earth - An EO Treatise" for Committee on Earth Observation Satellites (CEOS). The CD-ROM focusses the value and benefits of EO technology by chronicling various applications from different parts of the world. A total of 28 case studies have been included in the CD-ROM and this covers different themes viz., agriculture, forest, drought, flood, health, ice/snow, marine, night time images, sustainable development, terrain analysis and urban planning. The CD-ROM is a multimedia presentation material that includes text, images, graphics, video and audio elements for the different case studies. Each application demonstrates how value/benefit has been derived by using EO data and also the changes that have happened on the Earth's surface.

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Disaster Management Support Ad Hoc Working Group

Ms. Helen M. Wood
Chair, DMSG, NOAA

The formation of an Ad Hoc Working Group on Disaster Management Support was approved at the 13th CEOS Plenary held in Stockholm, Sweden, November 1999. The purpose of the Group is to support natural and technological disaster management on a worldwide basis by fostering improved utilization of existing and planned Earth Observation (EO) satellite data. The Group continues the work carried out over the past two years by the IGOS Disaster Management Support Project, which it replaced. The group will continue to develop and refine recommendations for the application of satellite data to several hazards areas. Particular emphasis will be placed on working closely with space agencies, international and regional organizations, and commercial organizations on the implementation of these recommendations.

The work of the Working Group has progressed significantly since last reported in the September 1998 CEOS Newsletter No. 11.
(http://ceos.eoc.nasda.go.jp/ceosnews11_5_e.html)

Participation in the project has increased steadily, with representation currently from more than 300 organizations that have sent representatives to the 11 meetings held over the last two and a half years. While earlier meetings focused primarily on a review of related activities, later meetings, including two NOAA hosted workshops, focused on refining findings and recommendations of the Group and its seven Hazard Teams, and guiding the prototyping activities of the Group's CEOS Disaster Information Server. Each Hazard Team is charged with reviewing existing documentation and practices and compiling concise requirements focused on specific hazard areas—drought, earthquake, flooding, fires, landslides, oil spills, and volcanic hazards. An earlier Tropical Cyclone Team was retired, the Landslide Team recently added, and the Volcanic Ash Team expanded to include all volcanic hazards. The work of the Group has been published in two annual progress reports. A copy of the 1999 Progress Report can be obtained from the Group Secretariat. The Group's work, including corrections and additional refinements, is also available on the project web site.

Group findings and recommendations

There are currently twelve Group level recommendations derived from nine findings. The findings note that disaster managers often recognize the value of and are willing to use new satellite technology, but may be reluctant because the technology is unfamiliar and unproven in an operational environment. The recommendations suggest ways the space community might respond, e.g. by promoting mutual dialogue, creating user friendly tools, performing compelling demonstrations, and using integrated approaches to create more user friendly products and services.

Hazard Team findings and recommendations

There are numerous findings and recommendations from each Hazard Team including specific satellite observational and derived product requirements. The following are a sampling.

Oil Spill

Several sensor types can support oil spill management, to a varying extent. However, SAR holds the most potential for improvements. Insufficient frequency of coverage and cost of data impede routine, large-scale operational use of SAR data. The following table provides a summary of end user SAR minimum (threshold) and optimum requirements.
(Threshold/Optimum)

Use Case	Spatial Resolution	Spatial Coverage (Swath Width)	Temporal Resolution	Tasking Time	Delivery Time
Enforcement /monitoring	100m/ 50m	100km/ 300km	Weekly/ Daily	Not Applicable	3 hours/ <1 hour
Major coastal/ spill-accident	20m/ 5m	30km/ >100km	Daily/ Hourly	2 days/ <1 day	2 hours/ <1 hour
Minor coastal/ spill-dumping	100m/ 50m	100km/ 300km	Daily/ Hourly	Not Applicable	3 hours/ <1 hour
Spill distribution survey	100m/ 50m	100km/ 300km	Weekly/ Daily	Not Applicable	Not Applicable

Flooding

All phases of all flood types can be improved with better use of high-resolution satellite sensors. For example, the following table provides a summary of spatial resolution requirements.

Application	Phase	Threshold	Optimum	Sesor Type
Land Use	Pre-flood Post-flood	30 m	4~5 m	MSI
Infrastructure Status	Pre-flood Post-flood	5 m	≦1 m	PanVis
Vegetation	Pre-flood Post-flood	≦250 m	≦30 m	MSI/HIS
Soil Moisture	Pre-flood	1 km	100 m	SAR/PM
Snow pack	Pre-flood	1 km	100 m	SAR/PM
DEM (Vertical)	Pre-flood Post-flood	1~3 m	.10~.15 m	InSAR/ PanVis
Flood development and flood peak	During flood Post flood	≦30m	≦5 m	SAR/MSI/ PanVis
Damage Assessment	Post-flood	2~5m	.3m	MSI/PanVis/ SAR
Bathymetry (near shore)	Pre-flood	<1 km	90m	SAR/MSI/HIS

MSI= Multi-Spectral Imagery
PanVis= Panchromatioc Visible
InSAR= Interferometric SAR
HIS= Hyper-Spectral Imagery
SAR= Synthetic Aperure Radar
PM= Passive Microwave

Information Server

The Disaster Group server is being upgraded with an emphasis on improving information on each hazard page and adding information locator tools, e.g. a contacts database and a "hot events" page. The contacts database will allow a potential user to locate providers of data and products that can support disaster

(to be continued on page 10 & 11.)

Comisión Nacional de Actividades Espaciales (CONAE)

Dr. Alberto E. Ridner
CONAE

The Comisión Nacional de Actividades Espaciales -CONAE- was created in 1992 as the Argentine civilian agency responsible for the development of space activities in Argentina. Since 1994, its actions are governed by the National Space Program, an 11 years strategic plan devoted exclusively to Earth Observation, which is revised and extended every two years. CONAE was welcomed as a member of CEOS at the 13th CEOS Plenary in Stockholm in November, 1999.

Since the main goal of the National Space Program is to produce a positive impact in the country's socio-economic activities by means of the extensive use of information generated by space sensors, the development of CONAE is considered as an investment -as opposite to general expenses- in the national budget.

Within the scope of the National Space Program, CONAE is currently working towards the launch of its Earth observation satellite, SAC-C, in April 2000. This 475 kg satellite, which will be placed in a sun-synchronous orbit with a 9-16 days of revisit time, will carry a multispectral camera (5 channels, 180 m resolution, 360 km swath) specially designed to support Argentina's agricultural production, forestry and coastal monitoring, fulfilling the need for a higher revisit time than the one offered by Landsat, and better resolution than the NOAA satellites. It will also carry a high sensitivity panchromatic camera and several experiments from Denmark (DSRI), France (CNES), Italy (ASI) and USA (NASA).

SAC-C will integrate, together with Landsat 7, EO-1 and Terra of NASA, a single constellation, during the twelve months following its launch. In this configuration, the satellites will pass over the same point during a 30 minutes time window, thus allowing an almost simultaneous observation with several cameras and instruments under the same light and atmospheric conditions.

CONAE has also developed the SAC-A satellite, which was launched by NASA in December 1998 and operated flawlessly during 1999. It was a technological mission entirely planned, designed and built in Argentina, including its solar panel and inertial wheel. It carried a camera with a solid state recorder, a GPS for orbit and attitude determination and other experiments.

Following Earth Observation missions (2002 to 2004) include: CESAR, in association with Spain (currently in phase B); SABIA3, with Brazil; and SAOCOM (two satellites, under construction).

The SAOCOM mission will carry an L band Syntheuc Aperture Radar, 10 m resolution, and a high sensitivity optical camera. Together with the Italo-European COSMO-SKYMED constellation, SAOCOM will conform the Sistema Italo Argentino de Satelites para la Gestion de Emergencias (Italian Argentine Satellite System for Emergency Management) of 9 satellites devoted to natural disasters management, with optical and SAR instruments.

CONAE's ground segment, Estacion Terrena Cordoba, is currently receiving and distributing data from the Landsat 5-7, SPOT 1-2, ERS 1-2, SeaStar Seawiff and NOAA satellites and also operates CONAE's missions. Its modern facilities allow to process and deliver the orders to Argentine customers in less than 24 hs.

In cooperation with DLR, CONAE is developing a Telemedicine program devoted to extend medicine support to peripherical regions or isolated populations, using technology derived from space activities: remote sensing and control, high volume data transfers, communications, etc.

CONAE is member of the Federal Emergency System of Argentina.

CONAE strongly pursues activities in cooperation with other space agencies. Currently, it has active programs with NASA, AEB, ESA, ASI, CNES and DLR.

(continued from Page 9.)

Disaster Management Support Ad Hoc Working Group

management for specific disaster types and phases. The "hot events" page is a selected list of Internet sites where users can get information and data for recent disaster events. A landslide hazard page has recently been developed.

International Ocean-Colour Coordinating Group (IOCCG)

Dr. Trevor Platt
Chair, IOCCG

The International Ocean-Colour Coordinating Group (IOCCG) was established in 1996. In 1998 the group became an Affiliated Program of the Scientific Committee on Oceanic Research (SCOR) which now provides infrastructure support and financial management for the group. In November 1999, the IOCCG became an Associate Member of CEOS.

The IOCCG consists of a committee of experts in the field of satellite ocean colour, which acts as a liaison and communication channel between users, managers and agencies in the ocean-colour arena. The aims of the IOCCG include promoting strong international cooperation and coordination in the acquisition, calibration, validation, distribution and utilization of ocean-colour data as well as broadening the user community for ocean-colour data, particularly in developing countries, through advanced training courses. Activities of the IOCCG are sponsored by several major Space Agencies and other institutes including NASA, NASDA, ESA, Joint Research Centre of the European Commission, IOC, CNES and the Canadian Space Agency.

A major focus of the IOCCG has been the initiation of specialized working groups to synthesize and summarize the state of knowledge on various aspects of ocean-colour technology and its applications. The end product of these working groups is the publication of a scientific report which is used to provide appropriate advice to Space Agencies. Two IOCCG reports have been published in this series: the first report entitled "Minimum Requirements for an Operational Ocean-Colour Sensor for the Open Ocean" (IOCCG Report Number 1) was published in November, 1998 and explored the feasibility of including a minimum set of common spectral channels on all future ocean-colour sensors. The second report entitled "Status and Plan for Satellite-Ocean-Colour Missions: Considerations for Complementary Missions" was published in May, 1999. It dealt with the technical requirements for global-scale, operational, remote sensing of ocean colour in both Case 1 and Case 2 waters, and also addressed the issues of complementarity that arise when more than one sensor with similar capabilities is in orbit at the same time. A third report, which deals with various aspects of remote sensing in complex Case 2 waters, including improved algorithms for retrieval of chlorophyll, sediments and dissolved organic matter from satellite data, is currently in draft form and should be published early in the new year. Other IOCCG working groups in progress include "Calibration of Ocean-Colour Sensors to Common Standards" and "Coordination of Merged Data Sets".

The IOCCG also has a commitment to training and education and has coordinated and sponsored three major training courses on remote sensing of ocean colour. The first took place in November, 1997 in Olmué, Chile, the second in January, 1999 in Bangalore, India (a component of a broader JGOFS training course), and the third in November, 1999 in Bangkok, Thailand. Course evaluations indicated that students were given a comprehensive overview of ocean-colour remote sensing and had acquired the necessary skills for processing and interpreting satellite ocean-colour data. The timeliness of these training courses will be enhanced by the wealth of satellite ocean-colour data which is currently available from the new-generation of ocean-colour sensors.

The IOCCG also coordinates with other global scientific programmes such as NASA's SIMBIOS Project (Sensor Intercomparison and Merger for Biological and Interdisciplinary Oceanic Studies) and the JGOFS Project (Joint Global Ocean Flux Study). In addition, the IOCCG continues to support the CEOS initiative for an Integrated Global Observing Strategy (IGOS) through collaboration with GOOS (Global Ocean Observing System) and its various Scientific Steering Committees.

For further information please consult the IOCCG server at: http://www.ioccg.org

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A Note from the Incoming Chair

Mr. Marcio Barbosa
CEOS Chairman, INPE

For INPE it is an honor and a great responsibility to serve as CEOS Chair for the first time. In its seventeenth year of existence, CEOS has achieved full maturity and a high international visibility among both the scientific community and the commercial sector. These accomplishments were thoroughly demonstrated last year in Vienna, with CEOS' strong presence at UNISPACE III.

It is therefore a challenge to keep up the high standard attained by past Chairs with the help of our very able Secretariat, the excellent performance presented by our Working Groups and the competent efforts of the Strategic Implementation Team (SIT). I am fortunate to rely on their continuing support and contribution during this period.

After exactly ten years, it will be a pleasure to host a CEOS Plenary meeting for the second time. It is also a happy coincidence that the Chair comes to Brazil just after we have put into operation the first China-Brazil Earth Resources Satellite (CBERS-1). I believe it comes in timely for a more active INPE contribution to the CEOS scenery.

In that scenery, important developments must still be carried out and carried on, like continuing to support the Integrated Global Observing Strategy (IGOS) initiative, whose leaders shall again meet in conjunction with the CEOS Plenary this year. The ocean theme of the initial phase should be complemented by additional ones aimed at shorter term benefits for people around our planet, such as disaster applications. Compatibility and complementarity of spaceborne observing systems must be kept in sight to optimize the use of resources required for their placement in service.

A particular concern of mine is related to the influence of the growing availability of commercial high-resolution orbital imagery. CEOS may have something to work out in this respect. Another area that I see with great interest is the Internet explosion and its potential benefits for data transmission in both scientific and commercial applications. Again, CEOS should not be indifferent to the latent implications of this evolution concer Earth Observations data.

In fact, CEOS' Mission is as dynamic as its very field of work. I am happy that its current structure and status, thanks to all the individuals that helped bringing them up, seem fully appropriate to cope successfully with the challenges it has to face in the near future. I am confident that with the summed contribution of those individuals, which I'm proud to be part of, the Year 2000 term will round up as well as that number.

Contributions for future issues of the CEOS Newsletter from the CEOS Members and Associates, and subscriptions to the CEOS Newsletter, please contact CEOS Japan Secretariat : ceosj@eoc.nasda.go.jp
http://nasda.ceos.org/ceosnews_menu_e.html

Meeting Calendar

As of Feb. 2000

Activities	2000 January	February	March	April	May	June	July	August	September	October	November
CEOS Plenary											▲8-10 14th Ple INPE/Bi
CEOS WGISS (Working Group on Information Systems & Services) **Subgroups Task Team**				▲10-14 WGISS-SGs London	▲10-12 WGISS-10 CSIRO/Canberra ▲15-16CD-ROM				△ WGISS-11 △ SGs		
CEOS WGCV (Working Group on Calibration and Validation) **Subgroups**		▲21-25 WGCV-16 ISRO/Bangalore ▲ Traceability SG				△ Land Validation CNES/Toulouse					
CEOS DMSG (Ad hoc Disaster Management Support Group)		▲14-15 DMSG Planning Mtg. NASDA/Tokyo				▲6-8 DMSG CSA/Ottawa					
IGOS/SIT (Strategic Implementation Team) **Themes**	▲24 Interim SIT WMO/Geneva		▲26 SIT-6 Cape Town			▲6 SIT-7 Geneva					
IGOS/Partners	24-25▲ WMO meeting WMO/Geneva	▲8-11 TCO Wksp GTOS/IGBP/OGPS-P/Ottawa		GTOS-IGBP Wksp Azores. Portugal	▲▲15 GODAE Patron, UK	▲7 IGOS-P5 WMO/Geneva					
Others			▲27-31 ISRSE CSIR/South Africa		▲8-6/2 WRC-2000 Turkey	▲6 G3OS Spons. WMO/Geneva	▲17-21 ISPRS Amsterdam ▲24-28 IGARSS Honolulu		△ ESCAP FAO	▲2-6 IAF INPE/Brazil	▲13-24 COP-6 Hague ▲7-16 SFCG-20

▲ : determined △ : to be determined (Date, Host organization/Location)

CEOS-related meetings are open only to designated participants.

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